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TECHNOLOGY DEPARTMENT

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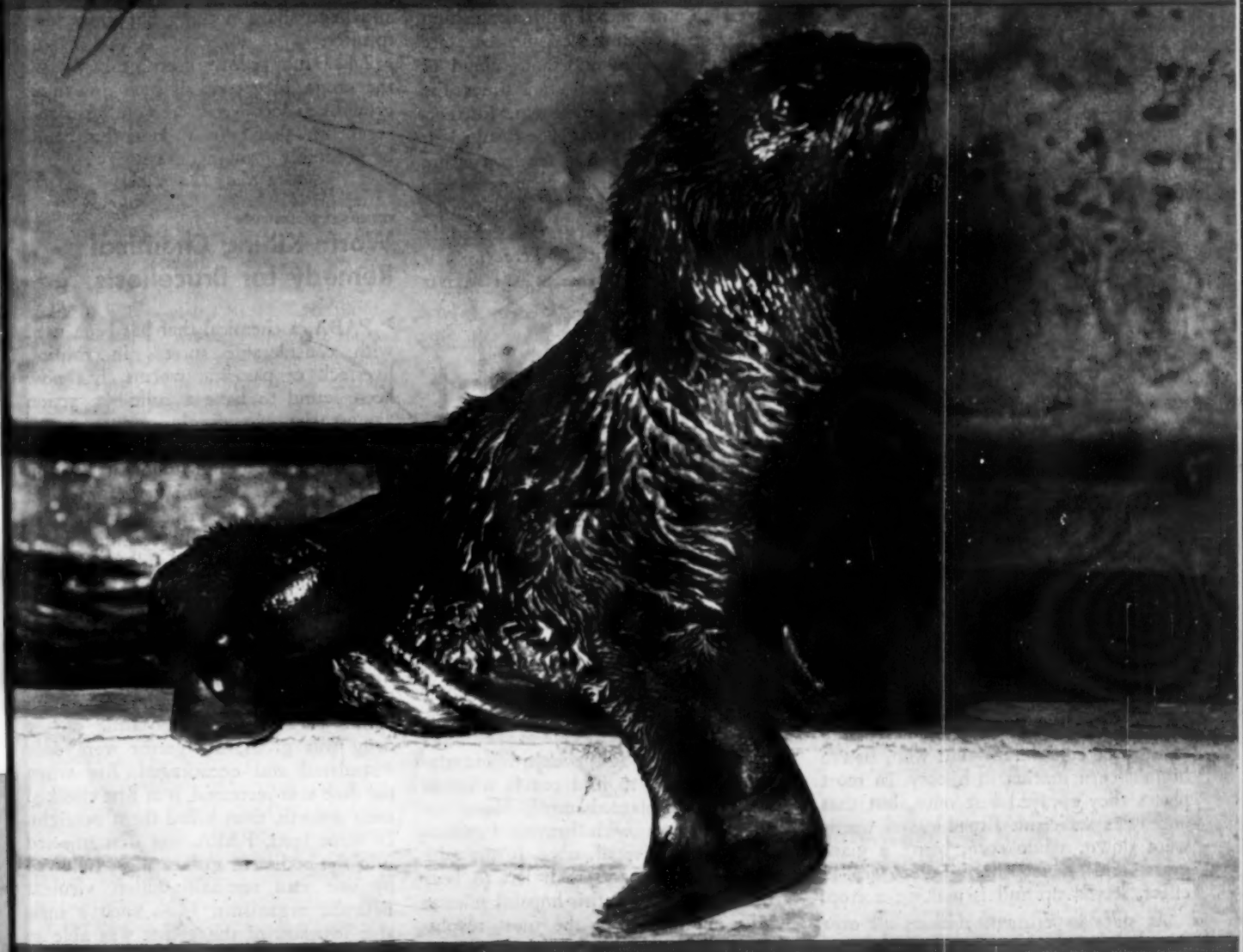

Rare Pelt

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A SCIENCE SERVICE PUBLICATION

ASTRONOMY

Red Star Secret Unfolded

Antares, star of mystery, consisting of a red member and a blue part, is at the heart of enormous cloud of iron particles. Iron is not gas.

➤ A GIANT red star deeply enveloped within an iron curtain has had its mystery pierced by an American astronomer, after seven years of ceaseless watching.

The star is Antares, that glows redly in the southern constellation Scorpio; it is sometimes called "heart of the scorpion." It really consists of two stars, a giant red member 450 times the diameter of the sun, and a much smaller, terrifically hot, blue globe that seems to consist mainly of helium.

The astronomer is Dr. Otto Struve, who is director of two observatories: the Yerkes observatory of the University of Chicago and the McDonald Observatory of the University of Texas on Mt. Locke. Since 1940 he has been waiting for the perfect atmospheric conditions that would permit him to separate the light from the two close companions on his spectrographic plates.

When he finally did get this astronomer's dream of a perfect night, his plates showed an unexpected and astonishing result: Both red and blue members are at the heart of an enormous cloud of iron particles that has ten times the diameter of our solar system. Furthermore, he reported to *Science* (Aug. 15), their light indicates that the iron is not in gaseous form, but exists as extremely minute solid particles, resembling the meteors or shooting stars familiar nightly in the earth's upper atmosphere.

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AGRICULTURE

2,4-D Only Begun To Fight

"Chemicultivation" with 2,4-D has saved corn and work too. Weed-killer may make closer spacing of corn plantings possible. Other crops have benefitted also.

➤ ONE of the most spectacular uses of 2,4-D this year has been the rescue of thousands of acres of corn, in fields so wet from the June-July deluges that it was impossible to kill their weeds by conventional methods of cultivation. Farmers, desperate in the face of threatened losses, gambled with the new spray method of cultivation—and won, in the highest corn market in history. In most places they sprayed just once, but that once was sufficient. Broad-leaved weeds went down, while corn, being a giant grass and hence immune to 2,4-D effect, stayed up and is making a crop.

At state experiment stations all over the country agronomists are ringing the changes on this new method of "chemicultivation." If one spraying will "lay by" corn that used to require three or four cultivations with steel-bladed implements, that will break a farm-labor bottleneck. At present, corn must be cultivated just at the time the hay harvest is prime, and when a few days enforced idleness due to rain may raise very hob with the farm work schedule.

Another vista opens up before the eyes of 2,4-D enthusiasts. At present, the spacing of corn plantings is determined more by the requirements of cultivation machinery than by the growing needs of the corn plant itself. One of the things that agronomists at the experiment stations are trying to find out is whether corn can be planted much closer together, perhaps with heavier fertilization, spray-cultivated once before the seed germinates, and then left to bear a heavier harvest. If this hopeful scheme works out it will be the most revolutionary thing that has happened to corn since the commercial introduction of hybrid varieties.

But corn is not the only crop to benefit from 2,4-D. This murderous chemical can be used to benefit crops that aren't even there. Such a paradox has arisen in Florida, where a blue-flowered creeping weed known as the day-flower is the carrier of the virus of celery mosaic disease. If the celery fields were sprayed when the crop was in, the celery would be killed, too. So the fields are sprayed well in advance of setting out the crop, to kill the day-flower. After the 2,4-D effects have had time to wear off it is safe to put in the celery, which then stays free of mosaic.

Out West, experience in ridding lawns, parks and golf courses of weeds with 2,4-D is being put to account in obtaining cleaner grass seed for re-establishing depleted rangelands. 2,4-D'd before blossoming-time, the seed plots are free of broad-leaved weeds, and hence have nothing but grass seed to offer.

2,4-D may prove useful directly on the range, to get rid of such unwanted growths as loco-weed, creosote bush and sagebrush, that take up land that could be profitably growing grass.

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VETERINARY MEDICINE

Worm-Killing Chemical Remedy for Brucellosis

➤ PABA, a chemical that has been used with considerable success in ridding livestock of parasitic worms, has now been found to have a sulfa-like action against the exceedingly minute germs called Brucella, that cause contagious abortion in cattle and undulant fever in human beings. This new usefulness of an old drug was described by Drs. Cornelia M. Cotton and Robert E. Swope of the University of Maryland, before the meeting of the American Veterinary Medical Association in Cincinnati.

PABA, which is shorthand for para-aminobenzoic acid, was effective against the Brucella organism both in glass laboratory vessels and in the living bodies of animals. If too little of the drug was given, the germs were only stimulated and encouraged. But when the dose was increased, it at first checked their growth, then killed them outright. In some tests, PABA was first injected into the bodies of guinea pigs, followed by one and one-half billion virulent Brucella organisms. Even such a massive invasion of the germs was able to accomplish nothing; at the end of five weeks no trace of them could be found in the animals' bodies.

Unlike some germ-stopping drugs, PABA seems to produce little toxic effect on the animal under treatment, even when they continue to receive the drug for several weeks.

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BIOCHEMISTRY

Anti-Germ Body Chemical

Histamine fights germs invading the body by activating the cells that eat the disease-makers. This protein has decisive role in germ battles.

➤ THE "DECISIVE" part in some of man's battles against disease germs is played by a body chemical called histamine. Studies leading to this conclusion are reported by Dr. Miklos Jancso, of the University of Szeged, Hungary, in *Nature*.

In the war against germs, certain cells of the body do their job by swallowing or eating the invading disease germs. These germ-eaters are called phagocytes.

Histamine, Dr. Jancso finds, transforms certain cells of the body from their resting state into active phagocytes or germ-eaters.

The phagocytes swallow or engulf other things besides disease germs. Among such things is India ink. Dr. Jancso used this in his studies. He painted a solution of histamine on the skins of rats and then injected India ink into their veins. The histamine-smeared areas showed gray spots.

"One can indeed 'write' with histamine on the skin," he describes it.

The histamine transformed the resting cells into phagocytes which then ate up the India ink just as they would eat up disease germs.

If mice and rats are given daily injections of histamine in gradually increasing doses, their bodies develop tolerance for the chemical. Then it no longer activates phagocytees. The histamine-activating effect can also be checked by preliminary treatment with an anti-histamine chemical. Dr. Jancso used one called antistine. There are many of these and some have been used in treatment of hay fever and other allergic disorders, on the theory that allergies are due in part to overproduction of histamine by the body.

As the activator of the phagocytes, histamine, Dr. Jancso contends, "takes a central role in the defensive and recuperative" reactions of the body.

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INVENTION

Rocket for Life-Saving

➤ A FORWARD step in coastal life saving has been taken with war-born equipment used to shoot telephone wires across wide rivers. It is a method in which steel cables, by use of rockets, are thrown from shore to stranded vessels, or from the vessel to shore, to serve as life-lines.

The equipment for this purpose, while basically similar to that used in the war, contains important improvements. One is its reel from which the cable is "cleanly" played out; another is a line-carrying projectile which can anchor the end of the line when it hits its objective.

Standard reels carry either 500 or 1,250 feet of cable, one-eighth inch in diameter, which has a breaking strength of 2,000 pounds. Cables from several reels can be connected so that when the line on the first is played out the line on the next follows.

Cables of other sizes and strengths may be used. In one test, in which Navy rocket motors were used, a quarter-inch cable was stretch a distance of 1,171 feet. This cable had a breaking strength of 7,000 pounds.

The projectile to which the line is attached is called a "stake ground anchor." Its pointed end permits it to penetrate deep into the earth where it is held firmly embedded by two backward-projecting spurs on its side.

This new equipment has many advantages over the well-known and long-used method of shooting rope from cannon on the shore over a wrecked vessel. Its aim is more accurate. The speed and the light weight of projectile and line make it less affected by wind. The steel cable used need be only one-third as heavy as a rope of equivalent strength. With it, there is no need of throwing first a light line by means of which the supporting rope is pulled out to the ship.

LIFE - SAVING EQUIPMENT — The backward projecting points on the line-carrying projectile anchor it in the ground when it strikes, giving a firm hold to the cable which has been unwound from the large reel shown.

The rocket-firing equipment can be carried as standard equipment aboard ship. This would make it possible for a wrecked vessel to throw its own line to shore and save its own passengers and crew without waiting for shore aid.

The same ship-borne equipment can be used at high sea to cast a life-line to a neighboring vessel, or to get a tow-line to a disabled ship. The equipment can assist bridge builders in spanning deep chasms and rivers. There is a special job for it in fire rescue work. The reels are made by Intertype Corporation, Brooklyn, N. Y. The inventor is Wadsworth W. Mount, Summit, New Jersey.

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BIOLOGY

Nine Kinds of Mold Work Toward Ruin of Soft Corn

➤ MUCH CORN that succeeded in running the gantlet of early floods and later drought will have to face a third hazard after harvesting. Because early frosts may catch it still "soft," that is, with high moisture content, it is apt to spoil through molding in the storage bins.

What happens when molds attack corn has been the subject of research by Dr. C. M. Nagel and Dr. George Sem-

eniuk working at Iowa State College.

They began by finding out what kinds of molds were at work on corn spoiling naturally. They were able to isolate nine distinct kinds: four of Penicillium (though none of the species that produces penicillin), four of the closely related Aspergillus, and one black bread-mold, or Mucor.

After culturing each kind separately, they inoculated flasks of sterilized corn of 32% moisture content with spores of each mold. Four of the molds—two Penicillia and two Aspergilli—prove most destructive to the corn solids. Any one of them would devour between 40% and 45% of the organic matter in corn in a four-week period. At the same time, the water content of the spoiled corn increased.

Another effect of mold spoilage is an increase in the amount of fatty acids present. These are the acids characteristic of rancidity in spoiled fats and oils. Some of this increase in fatty-acid content in moldy corn is due to the breakdown of the natural corn oil, but part may be due to direct production of fatty acids by the molds themselves.

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VETERINARY MEDICINE

Guard Public Health

Veterinaries discuss some of the dangers, including the Salmonella that cause food infection. Alert meat and milk inspection can avert community ills.

➤ SAFEGUARDING the public health makes demands on veterinarians as well as on public health officials and medical practitioners who serve human patients. At the meeting in Cincinnati of the American Veterinary Medical Association, various problems involved in the health interrelationships between man and his animals came up for discussion.

Among the threats to human health from diseased animals, some of the worst come from the small but hard-to-defeat group of germs known as Salmonella. Dr. Arthur H. Wolff of Lansing, Mich., told of these. Salmonella can cause food infection, producing typhoid-like diseases. Such infections are especially likely to occur in meat from sick animals; alert veterinary inspection can head them off.

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Practitioners Can Help

➤ PUBLIC HEALTH can be served not only by the veterinarian on the public payroll; it can and should be the concern of the private practitioner making his rounds, urged Dr. C. S. Bryan of Michigan State College. He is in especially good position, the speaker asserted, to promote rural public health, particularly in his recommendations regarding disposal of sick animals.

Above all, Dr. Bryan declared, the practicing veterinarian should safeguard the sources of milk: "In my opinion, the sanitary production of milk is just as important to the veterinarian as is the control and treatment of animal disease, and experience has demonstrated that the dairyman and the community appreciate and are willing to pay for this service."

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Chickens Germ Smugglers

➤ ANOTHER PLACE where the veterinary must maintain close watch, stated Dr. P. J. Brandly of the U. S. Department of Agriculture, is the poultry market. Chickens and other birds that man eats almost seem to be especially designed to smuggle germs into him. Dr. Brandly listed by name an even dozen causes of disease in man that can be carried by poultry, to which he added "and 43 paratyphoid organisms which have been isolated from both man and birds."

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Where Does Vet Fit In?

➤ SELECTING the proper niche for the veterinarian in a well-rounded public-health setup will have much to do with his effectiveness afterwards, Dr. Martin D. Baum of Los Angeles pointed out. The U. S. Public Health Service has established a special branch for him, the Veterinary Public Health Section; the speaker expressed the hope that this pattern might be followed at state and municipal levels.

He recommended also that diseases of animals transmitted to man be made reportable, with special effort to indoctrinate both veterinarians and public health officers in the importance of such reporting.

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NUTRITION

Best Buys in Vegetables

➤ THEY MAY NOT taste best to you, but the best buys in vegetables these days are carrots and Hubbard squash.

They are inexpensive and each furnishes eight nutrients. That is more for your money than other vegetables, according to home economists at Cornell University.

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VETERINARY MEDICINE

Steps To Control Rabies

Federal control commission to take responsibility of activities to check rabies. Methods based on scientific information can be adopted.

➤ FIRST STEPS toward a federal rabies control commission are being taken by the U. S. Public Health Service with the cooperation of the Alabama and Georgia state health departments, it appears from a report to the American Veterinary Medical Association meeting in Cincinnati.

The commission would be composed of members from the U. S. Bureau of Animal Industry, the U. S. Public Health Service and the U. S. Fish and Wildlife Service, according to the plan outlined by Dr. Ernest S. Tierkel of Montgomery, Ala.

"Eradication of rabies is not possible in this country unless a properly authorized national agency assumes the responsibility of coordinating rabies control activities," he declared.

With a commission such as he described, a uniform pattern of rabies control methods based on proved scientific information can be drawn for adoption and action by the states. The commission could distribute to the states the best accepted procedures for diagnosing rabies. It would institute an accurate system of reporting rabies and keep local authorities posted on the most effective methods for immunizing, or vaccinating, against the disease. It could also prepare and distribute material for the education of the public on the problem.

In Alabama and Georgia epidemiologic studies are being started. The object is to form a basis for field demonstrations, on a county or multi-county health unit level, to evaluate various methods of controlling rabies. Mass vaccination of dogs, incarceration and impounding of strays, quarantine of exposed animals and concentrated trapping programs in areas where fox rabies exists are the methods to be tested.

Studies of another kind are under way at the U. S. Public Health Service's communicable disease center at Atlanta. Here scientists are experimenting to determine the length of time the commercial dog vaccines give protection against rabies. They are trying to refine the system of dosage to get the best results. They are testing the safety and relative effectiveness of newly developed vaccines from live rabies virus such as vaccines from virus grown on chick embryos. The effectiveness of experimentally killed virus vaccines, including those made from rabies virus weakened by ultraviolet light and others inactivated by mustard-gas chemicals, is being tested.

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PALEONTOLOGY

Smithsonian Finds Skulls Of Ancient Stick-In Muds

➤ THIRTY-FIVE members of an Oldest Inhabitants Club in what is now New Mexico were such stubborn stick-in-the-muds, some 150,000,000 years ago, that they died because they wouldn't (or couldn't) come up out of the wet. Now they are museum pieces: their skulls have been brought to Washington by Dr. D. H. Dunkle, who is paleontologist at the Smithsonian Institution.

The big find of ancient remains represents the highest type of vertebrate life known on earth during the transition period from the Age of Fishes to the Age of Reptiles. They were giant amphibians known scientifically as stereospondyls, relatives of the salamanders and mud-puppies of today. Their great size is indicated by the length of their skulls—two feet is not uncommon.

Dr. Dunkle states that in one slab of stone 40 feet square he found nine of these big skulls. Apparently the animals were caught in a drying pool and had no means for escape, since they were dependent on water to keep their scaleless skins moist.

During the Triassic Age, in which these creatures lived, a great part of the earth was apparently low and marshy. When geologic revolution set in, heaving up mountains and drying up the marshes, the more progressive reptiles, which could live on dry land, inherited the earth, while the giant amphibians perished.

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MATH BY MACHINE—This differential analyzer has accomplished in two weeks computations equal to 17 man-years of effort. Although the machine operates mechanically, it is electrically controlled. It has become part of the "figure center" at U. C. L. A.

AERONAUTICS

No Personal Jet Planes

Some jet engines may be used on commercial planes 10 years from now, but private planes will still have propeller-type engines.

► HIGH-SPEED jet planes may continue to break the speed records, but your own personal plane of 1957 will probably still use the familiar propeller-type reciprocating engine. This is the prediction of E. S. Thompson, aviation official of the General Electric Company.

Some jet engines will be used on commercial planes a decade from now, the aircraft engineer believes. But ten years from now he forecasts, military planes still will be the main users of the new high-speed propulsion units.

Large commercial planes and bombers will use jets, as will military pursuit planes. Rockets may be used on some pursuit planes, but the main use of rockets and the "flying stovepipe," ram jet, will still be on missiles and aircraft without human crews.

Here is the way aircraft will be powered in 1957, as foreseen by Mr. Thompson: Small personal planes and feeder line commercial craft will still use reciprocating engines. Some executive type or business planes will have the so-called "prop-jet," with a gas turbine engine driving propellers.

Medium-range commercial engines will have turbosupercharged engines and a few may have the prop-jet. Medium-sized, long-range commercial planes will use a compound engine and some turbo-jets, while the larger commercial aircraft will use prop-jets and some turbo-jets.

Military aircraft will use more jets. Medium-range bombers will have turbo-jet engines while longer range bombing craft will probably have compound engines, with the largest using prop-jets. A few may have turbo-jet engines. Pursuit planes of a decade from now will have turbo-jets and some rockets.

The reason jets will not be used on your personal plane of a decade from now is a matter of economy, Mr. Thompson explains in the *Coast Artillery Journal* (July-Aug.). Increased costs of several jet types of engine will not be practical for small, irregularly-used personal planes. Turbo-jets are inefficient at speeds below 400 miles per hour, and rockets are out of the question, even for assisting take-offs, because of high speeds and extremely high fuel consumption.

Jets will become increasingly common in planes, but if you buy a personal plane in 1957, you will probably find it has today's conventional type of engine.

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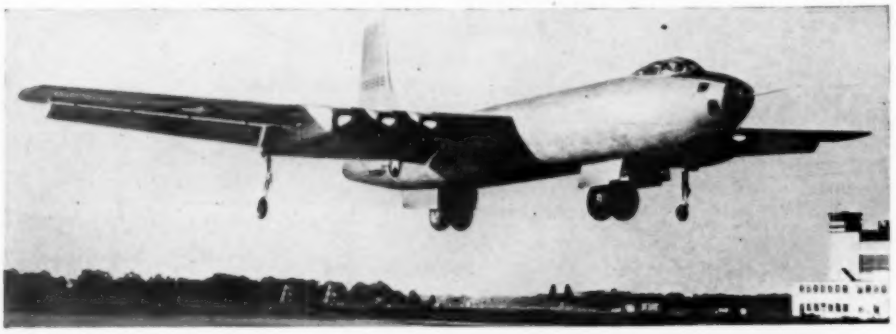

MARTIN XB-48—This is the largest multi-jet bomber of conventional design ever built for the Army Air Forces. It has six jet engines.

PHYSIOLOGY

Vitamin C Needed For Adaptation to the Cold

► FOR THOSE who have pulled out of the heat wave enough to start thinking about winter weather problems, here's a tip: vitamin C, the orange, lemon and tomato juice vitamin, will help your body get used to and withstand severe cold.

The winter weather tip comes from studies by Drs. Louis-Paul Dugal and Mercedes Therien of Laval University in Quebec. Both rats and guinea pigs were used in their studies. Guinea pigs, like man, depend on food for their vitamin C. Rats, unlike humans, can make it in their own bodies.

The amount of vitamin C in the body tissues of rats kept in the cold, between about 24 and 39 degrees Fahrenheit, increased as much as 80% over the amount in the tissues of rats kept at room temperature. So the rats evidently made more vitamin C to help their bodies adapt to the cold. Rats dying in the cold have a very low content of the vitamin in their tissues.

The guinea pigs, more than 600 of them, were divided into nine groups. Each group got a different sized daily dose of the vitamin. Half of each group was kept at room temperature, the other half in the cold. The ones at room temperature all behaved in the same way and all thrived. But the only ones able to adapt to the coldest temperature (about 17 degrees Fahrenheit), were the ones that got the largest daily dose of the vitamin. This dose was 150 times the daily dose needed to prevent scurvy in the animals.

The groups of guinea pigs were eliminated or lost weight one by one as the temperature was lowered, according to the amount of the vitamin they were given.

A relation between adaptation to cold and the amount of vitamin C in the animals' body tissues, particularly the adrenal glands, was observed. This, together with work by other scientists, suggests that vitamin C is beneficial to all animals unable to make the vitamin in cases where the response of the animal to some sort of stress involves activity of these glands. The stress may come from intense work, poisonous substances and other damaging agents that cause an "alarm reaction" in the adrenal glands.

Details of the vitamin C studies are reported in the *Canadian Journal of Research* (June).

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Spain, Italy, Greece and Portugal are the principal olive-producing countries in Europe in the order named; Europe is responsible for 85% of the world's supply of *olive oil*.

At the present rate the U. S. Civil Aeronautics Administration will have the country blanketed in two to three years with very high frequency (VHF) *radio comunication* and radio ranges replacing the low-frequency type.

MEDICINE

War Provides Remedy

Poison gas made in England for war use, discovered to have useful role against paralysis of the intestines, declares president of British Association.

Scientists gathered this week in Dundee, Scotland, for the first time since the beginning of the war, for the meeting of the British Association. This is the first report received from the gathering.

➤ AMERICAN scientists have found an "invaluable remedy" for a dangerous paralytic condition in a poison gas made in England for war use, Sir Henry Dale declared in his presidential address to the British Association for the Advancement of Science meeting in Dundee, Scotland.

The condition is the paralysis of the intestines which sometimes follows an abdominal operation and may even kill the patient. Intestinal paralysis is also sometimes a complication of infectious diseases such as pneumonia.

Discovery of this useful role for the poison gas was made by Prof. A. M. Harvey and Drs. D. Grob, J. L. Lilienthal, Jr., and B. F. Jones of the Johns Hopkins Hospital and Medical School.

The chemical is known as DFP, short for di-isopropylfluorophosphate. English scientists first made and studied it because they knew a series of chemically related poisons were under trial in Germany as potential weapons of chemical warfare.

Scientists of the U. S. Chemical Corps at Edgewood Arsenal and civilian doctors at the University of Pennsylvania reported more than a year ago that DFP might be useful in the serious eye disease, glaucoma, and in the muscle weakness condition, myasthenia gravis.

Its use for intestinal paralysis has only just been reported. It has been given to almost 100 patients with this condition and the surgeons using it are very pleased with it.

Doctors using it, however, are warned by the Hopkins group to remember that it is a poisonous substance and must be used with great care.

DFP produces its many effects by destroying a body chemical called cholinesterase. This body chemical, called ChE for short, plays an important role in relation to the transmission of nervous effects. There are other chemicals, such as neostigmine, which can check ChE activity for a short time, but they do not destroy it as DFP does.

DFP not only causes a tremendous activity of the stomach and intestines but sensitizes the gut to other substances, such as neostigmine and pitressin. Patients with intestinal paralysis which is not helped by neostigmine or pitressin can be given a dose of DFP and then further doses of neostigmine if necessary.

In spite of this and other examples of practical peacetime results of wartime scientific research, scientists must beware, Sir Henry warned, of continuing "the spendthrift habit in research, the policy of trading for quick returns which six years of war experience may so easily have fostered and may even have made congenial to many of us."

Political and administrative activities of scientists may be a dangerous waste of their talents, he warned.

"The building up of our scientific capital of fundamental knowledge by those who have the creative gift should," he declared, "have prior claim over its practical exploitation and over any cultivation of its political influence."

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CHEMISTRY

New Soapless Soap Kills Germs Without Excess Suds

➤ SOAPLESS SOAP that kills germs efficiently in the washing machine and yet doesn't produce excessive suds to prevent cleansing action has been invented.

Cleanliness in laundry work is increased by the new chemical attack on the dirty clothes problem, reported to the Eleventh International Congress of Pure and Applied Chemistry, which has just been held in London.

Bacteriological cleanliness is now achieved by washing with strongly alkaline chemicals, but they are bad for the clothes. Some of the new ammonium compounds used as detergents are good wetting agents and disinfectants, but build up so much foam that it interferes with the operation of the washing machine.

Drs. J. C. L. Resuggan and J. G. Davis, British chemists, reported to the meeting their solution of the dilemma by remaking the chemical structure of the detergent. Ammonium compounds heretofore used have been formed of long chains of 12 to 18 carbon atoms.

"It has now been found," Drs. Resuggan and Davis state, "that by substituting for the single long chain two shorter chains in a quaternary ammonium compound, ability to form stable foams in all but relatively high concentrations is destroyed, while, when suitable chains are used, the compound has considerable bactericidal and wetting powers."

The new compounds, with or without addition of a mild alkali instead of the present strong ones, are expected to kill germs better, help get the clothes cleaner, and avoid too much suds. Patents on this type of compounds have been applied for.

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PHOTOGRAPHY

Exposure Meter Described As Having a "Memory"

➤ A NEW photographic exposure meter, described as one having a "memory," is now in production by the General Electric Company. It is for use by both amateurs and professional photographers, and can be used with movie cameras.

The device enables photographers to determine proper exposures under varying lighting conditions. It is a photoelectric type. The makers say that it contains among its many features a pointer-locking mechanism, which "remembers" the light seen by the photocell; a louver-coupled dial, which "remembers" to shift the meter, automatically, from high light to low and back again as the scene requires; and the trident analyzer, which "reminds" the photographer to check the range of light on the subject.

Basically, every photoelectric exposure meter includes a light-sensitive cell, an indicating instrument, and some form of calculator for interpreting the instrument reading in terms of shutter speeds and f-stops. These are the sizes of various diaphragm openings. In the new meter, these various elements are so synchronized that it is not necessary to read the light scale, except under special conditions.

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America's record crop of *corn* in 1946, the largest in history, was due largely to the hybrid seed now planted and to an increased use of commercial fertilizer.

PHYSICS

Extreme Low Temperatures Obtained at Rutgers

➤ A TEMPERATURE of roughly 456 degrees below zero, Fahrenheit, was obtained at Rutgers University in a trial run of a new helium liquefier, it has been revealed. This is less than four degrees above what scientists call absolute zero, the point where matter contains no heat. A temperature of minus 458 is expected to be reached later.

The complicated machine, called a Collins helium cryostat after its designer, Dr. Samuel C. Collins of the Massachusetts Institute of Technology, works somewhat like the ordinary household electric refrigerator. Highly compressed gas is forced through a tiny jet. The cryostat, in addition, makes the helium gas used in it operate a piston-driven engine as another means of cooling the gas.

Other machines to reach temperatures approaching absolute zero have been designed and are in use. The device to be used at Rutgers will be employed in studying the fundamental structure of matter. It is expected to be used in exploring such things as the magnetic properties of the atom and the atom's nucleus.

Helium, the non-combustible gas used to inflate American balloons, is employed in this device because it becomes a liquid at a lower temperature than any other gas. Its liquefaction point is approximately 452 degrees below ordinary Fahrenheit zero, or about eight degrees above absolute zero.

Science News Letter, August 30, 1947

BIOLOGY

Germ Warfare Advances More Potent than A-Bomb

➤ ADVANCES in biological warfare have made the atomic bomb all but obsolete.

This is the opinion expressed by Dr. Brock Chisholm, executive secretary of the Interim Commission of the World Health Organization. Questioned at the Summer School of the World Federation of the United Nations Associations in Geneva, Dr. Chisholm remarked:

"Biological warfare has developed much more potency than the atomic bomb. Now continents could easily be wiped out."

He explained that armies, navies, and huge war plants are in effect relegated to no importance by frightful new biological weapons.

"The tiniest country now has the same war potential as the largest," the World Health Organization's executive secretary said. "All that is needed is an expert biologist with a laboratory and a small group of technicians. Methods of survival of 10 years ago are outdated. Efficiency in killing has outreached all types of defensive weapons. The old concept of new weapons producing counter weapons is no longer valid and there is no foreseeable way of coping with biological warfare. However, it should be remembered that those employing biological weapons could themselves become their own victims."

Dr. Chisholm said that the Interim Commission of the World Health Organization had thus far not considered the question of biological warfare. He explained that the United Nations' Security Council was charged with warfare matters but added that the World Health Organization might be called on for advice at a later date.

Science News Letter, August 30, 1947

CHEMISTRY

Germanium Used to Make Special Optical Lenses

➤ CHEMICAL ELEMENTS that used to be merely symbols on a classroom chart are one by one being drafted into industrial uses. Beryllium alloys are becoming familiar on the tool-bench; suburban gardeners push wheelbarrows and lawnmowers made largely of magnesium; uranium dominates the turbid politics of a shuddering planet.

Germanium, an element something like silicon discovered only two generations ago, now claims its place in the sun of science. Quite literally: its usefulness is in a new optical glass developed by a Chinese-born chemist in the research laboratories of the Eastman Kodak Company at Rochester, N. Y., Dr. Kuan-Han Sun. He has substituted germanium oxide for its familiar chemical analog silica (sand), in a formula including also titanium oxide and sodium fluoride, to obtain a glass with high refractive index, that should be especially useful in wide-angle camera lenses and microscope objectives.

Since current market price for germanium oxide is between $30 and $40 an ounce, immediate use is likely to be limited to special lenses. U. S. patent 2,425,403 has just been issued on the new fluogermanate glass.

Science News Letter, August 30, 1947

IN SCIEN

ENTOMOLOGY

Mosquitoes Grow in Trees In Northern South America

➤ MALARIA mosquitoes grow in trees on the cacao plantations of northern South America. This is no Munchausen tale of their building nests like birds or clambering around like monkeys. It is a serious report of a mosquito-control problem brought back to the U. S. Department of Agriculture by H. H. Stage, lately returned from a tour of investigation in the Caribbean area.

When planters arrange to set out a new cacao grove they first clear away all the jungle vegetation. Then, to shelter cacao trees, which like a certain degree of shade, they interplant a taller tree species, known locally as immortelle.

Bromeliads, or air plants, roost by thousands on the branches of these shelter trees. They are small plants of the pineapple family, and in the cuplike cavities at the bases of their curved, stiff leaves they catch and hold rain water. These minuscule ponds afford breeding places for one species of malaria mosquito, *Anopheles bellator*.

It is not practicable to attack these treetop mosquito nurseries with DDT, but planters in the British island of Trinidad have found a practicable solution for the problem. They use a powerful spray-pump to apply a dilute solution of copper sulfate to the air-plants. This kills them without harming either the cacao trees or their taller sheltering companions.

Science News Letter, August 30, 1947

ENTOMOLOGY

Oklahoma Ground Cherry Yields Good Fly Poison

➤ AN OKLAHOMA plant, commonly known as the smooth ground cherry, yields a chemical which is a good fly poison, Dr. Loyd E. Harris of Ohio State University College of Pharmacy reported at the meeting of the American Pharmaceutical Association in Milwaukee.

The technical name of the fly poison plant is *Physalis mollis*. Its anti-fly chemical is probably an alkaloid.

Science News Letter, August 30, 1947

NCE FIELDS

ZOOLOGY

Costly Fur Coats Displayed by Zoo

See Front Cover

➤ FOUR rare and expensive fur coats have arrived at the San Diego Zoo. The coats are being worn by their owners, a quartet of northern fur seals, the only ones in any zoo.

The four seals were donated to the zoo by the Fish and Wildlife Service for close-range study by scientists. Biologist William H. Sholes brought the precious cargo from St. Paul Island in the Pribilof group off Alaska.

Zoo personnel are going to keep the seals under close observation. Day-to-day study of the animals in the zoo will supplement the field observations of government scientists seeking more knowledge about the native life of this valuable species of fur coat.

Science News Letter, August 30, 1947

MEDICINE

Penicillin Successful For Babies' Sore Eyes

➤ THE SILVER NITRATE drops now routinely put into the eyes of newborn babies as prophylaxis against gonorrheal and other eye infections may be replaced by penicillin.

Success with penicillin eye drops and advantages of the mold chemical over the silver compound are reported by Dr. H. Charles Franklin of the University of Tennessee College of Medicine in the *Journal of the American Medical Association* (Aug. 9).

Ophthalmia neonatorum, meaning inflammation of the eyes of the newborn, is the condition for which the German obstetrician, Crede, first used silver nitrate as prophylaxis. Until recently, doctors used this medical term, and the layman used the term, "babies' sore eyes," to mean the inflammation due to gonorrhea which the baby got from its mother. Now the term is applied to all inflammation or soreness with pus in the eyes within two weeks after birth. The germs of gonorrhea are the ones demanding most attention from the standpoint of preventing blindness. But pneumonia germs and perhaps others which can get into newborn babies' eyes may be as damaging.

Penicillin checks these germs and the soreness of the eyes as well as silver nitrate does, Dr. Franklin found in a study of 1,710 infants. The mold chemical has the advantages of not being painful or irritating and of being safe so far as damage to the eyes is concerned.

Science News Letter, August 30, 1947

ORNITHOLOGY

Geomagnetism, Earth-Spin May Guide Homing Pigeons

➤ Are aviators about to take lessons in navigation from birds, as they originally took lessons in flight and soaring? Are ornithologists about to learn how homing pigeons find their way back home, and how migratory birds hold to a true course on night flights?

These questions are raised anew by a report given at the General Electric Forum, by Prof. Henry L. Yeagley of Pennsylvania State College, on the curious behavior of homing pigeons under his care during experiments for the Army Signal Corp.

Taken west of a certain midway point, the birds always flew to one spot in the state of Nebraska, instead of back to their home loft. Geophysical investigation showed that this western spot possessed the same intensity of earth magnetism, and also moved at the same rate as the earth turned on its axis.

Prof. Yeagley suggests that pigeons, perhaps birds in general, can sense these two things that we human beings do not feel, and that when taken away from home they fly in the direction that takes them towards the combination of geomagnetism and earth-spin to which they are used. They probably do not feel the earth's magnetism directly, he thinks, but do perceive differences in their own electrical state induced by flying across changing lines of magnetic force.

If Prof. Yeagley's hypothesis is valid, it might help explain a number of reported anomalies in bird behavior, such as the reported confusion of homing pigeons when in the neighborhood of radio towers, their inability to orient themselves when small but strong magnets are fastened to their legs, and the wild breakup of flights of ducks when radar beams were "squirted" at them by wartime experimenters.

Science News Letter, August 30, 1947

ASTRONOMY

Historic Telescope Is Being Sent to China

➤ AN HISTORIC American telescope is being sent to China's Sun Yatsen University Observatory in Canton.

The telescope is the 11-inch Draper refractor telescope of the Harvard College Observatory. Dr. Harlow Shapley, director of the Observatory and president of Science Service, said that dismantling and shipment of the instrument from Cambridge to China will be financed by funds contributed by Chinese residents of the Boston area.

Built originally for the Lisbon, Portugal, Observatory, the telescope was acquired by Dr. Henry Draper in 1880 for his observatory at Hastings-on-Hudson, N. Y. His widow donated the instrument to Harvard in 1886, and it has been in service there since.

First photograph of the great nebula of the constellation Orion, said by some observers to be the most beautiful object in the sky, was made with the Draper telescope. This instrument was also used by astronomers first to discover stars which have orbital motions around other stars and are called spectroscopic binaries.

Sun Yatsen University's observatory was founded in 1929, but most of its equipment was looted by the Japanese in 1938. The University is believed to be the only Chinese institution now offering courses in astronomy.

Science News Letter, August 30, 1947

CHEMISTRY

Pure Hydrogen Gas Made From Methanol and Water

➤ THE ABUNDANT and industrially important gas hydrogen can be cheaply made from methanol (wood alcohol) and water by a process on which patent 2,425,625 has been granted to a du Pont chemist, Dr. Alfred T. Larson of Wilmington, Del.

Methanol, which has the formula CH_3OH, can be cracked by an already known process to yield two molecules of hydrogen and one of carbon monoxide. Dr. Larson simply adds water, in the form of steam, in the presence of a catalyst. The oxygen from the water goes to convert the carbon monoxide to the dioxide, releasing one more molecule of hydrogen. The carbon dioxide is readily removed, leaving pure hydrogen to be "bottled" for use.

Science News Letter, August 30, 1947

ASTRONOMY

Stars of Autumn Now Shining

Planets are absent in evenings as September brings new season. Autumnal equinox occurs Sept. 23. Vega, in Lyra, the lyre, is brightest star.

By JAMES STOKLEY

► ALTHOUGH none of the naked eye planets is visible in September through the evening, the appearance of the star groups shows to one who knows the constellations that summer is nearing its end and autumn is about to start. Ever since last June the sun has been gradually creeping southwards. On Tuesday, Sept. 23, at 5:29 p.m., eastern daylight saving time, it will reach the half way mark, and stand right over the equator of the earth. This is the autumnal equinox—it marks the beginning of autumn, in the northern hemisphere, but in the lands south of the tropics, spring is now commencing.

As for the evening skies, we see on the accompanying maps their appearance at 11:00 p.m., daylight saving time of your own variety, on Sept. 1; 10:00 p.m. on the 15th and 9:00 p.m. daylight saving time, or 8:00 p.m. standard time (which will then be in effect) at the month's close. While no planets are visible at these hours, Jupiter, in the constellation of Libra, the scales, is visible low in the southwest at sunset, and disappears a couple of hours later. About three hours past midnight Mars appears, in the figure of Gemini, the twins. Still later, about two hours before sunrise, Saturn comes up, in the constellation of Leo, the lion, a little to the north of the east point of the horizon. Mercury and Venus this month are too close to the direction of the sun to be seen.

Vega Brightest Star

Turning to the stars, which are really distant suns, shining with their own light, Vega is the brightest shown. This is in the constellation of Lyra, the lyre, high in the west. Directly overhead is Cygnus, the swan, forming a huge cross, with the bright star Deneb at the top, toward the northeast. To the south of Cygnus flies another bird, Aquila, the eagle, in which Altair is the brightest star. Between Cygnus and Aquila are two interesting little constellations, now about at their best position of the year—Delphinus, the dolphin, and Sagitta, the arrow.

Toward the east, resting on one corner, is the "Great Square," which forms part of Pegasus, the flying horse. And below are Pisces, the fishes. The northernmost star in the square is in the neighboring group of Andromeda, the chained princess. Below her in the northeast the A-shaped figure of Perseus is shown, while lower still Capella, part of Auriga, the charioteer, is just coming into view. This is a constellation which shines high in the south during the evenings of winter, so its first appearance is a herald of the colder weather which approaches.

Arcturus Leaving Us

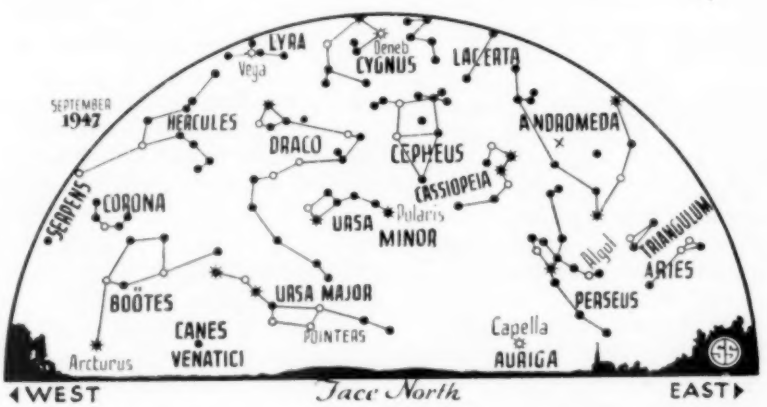
Low in the northwest Arcturus, in Bootes, the bear driver, which was high in the evening sky of early summer, is bowing out of the picture, for soon it will be gone from the evening skies until next year. In the south another star of the first magnitude is shown, though its proximity to the horizon, and the greater absorption of its light on that account, causes its seeming diminution to the second magnitude. This is Fomalhaut, in Piscis Austrinus, the southern fish. Above it is Aquarius, the water carrier, which, like Capricornus, the seagoat, next to it, and Sagittarius, the archer, in the southwest, are constellations of the zodiac. This is the path in the heavens through which the sun, moon and planets seem to move.

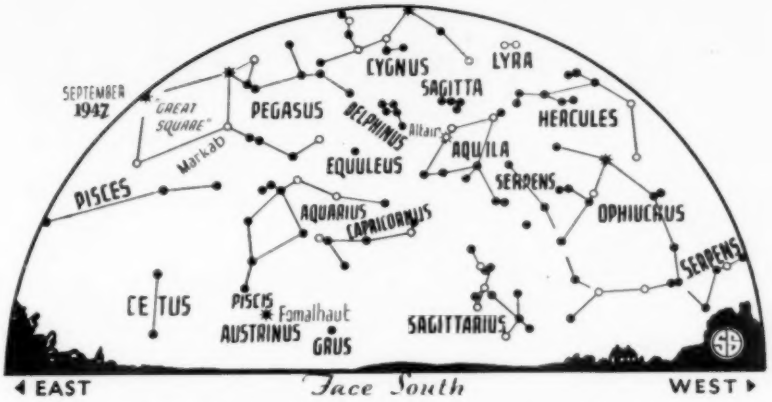
In the autumn months we have a good opportunity to see the Milky Way, for it then extends through the zenith. In competition with city lights it is hard to see, but out in the country it can be observed easily, as a luminous pathway extending from the constellation of Cassiopeia, the queen, a group in the northeast shaped like a letter W on its side. Thence we can follow it through Cygnus, and on south to Sagittarius.

Repeat Famous Discovery

With even a small telescope, or a pair of binoculars, we can make the same discovery about it that Galileo did in 1610 when he first studied the heavens with optical aid. We find that it consists of a mass of faint stars, each so distant that we cannot perceive it separately with the naked eye, but together their light combines.

It was Sir William Herschel, the 18th century English astronomer, who first offered a clear interpretation of the significance of the Milky Way in relation to the system of stars of which we are part. His studies made him realize that the reason that there are more stars in that direction is that we are there looking into a greater thickness of stars. Since the Milky Way extends completely around the sky, it means that in those directions we could travel much farther before coming to the end of the stars than if we went in other directions. In other words, our stellar system, which we call the "galaxy," has approximately the shape of a grindstone.





☼ ✸ ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

Our position is not at the center, which lies toward Sagittarius, but we are about 25,000 light years away from it. That is the distance that light, which travels about 11,000,000 miles a minute, would cover in a year. The brightest part of the Milky Way, therefore, is in the region of Sagittarius though because it is low in the sky this month it may not appear any brighter than the more favorably placed region above us in Cygnus.

Our galaxy is not the only system of its kind, but millions of others can be observed with telescopes outside its limits. One of these is visible to the naked eye. This is in the constellation of Andromeda, and its position is indicated on the map, by the small X under the letter R in the name of the group. This is so distant that for a long time its nature was quite a controversial matter among astronomers. Many of them thought that it and some other similar "spiral nebulae" were glowing clouds within our own system, for even the biggest telescopes failed to show any stars in their makeup. It took the 100-inch reflector at the Mt. Wilson Observatory, still the largest in the world, to break it up and reveal the separate orbs. When the 200-inch telescope at Mt. Palomar takes the title away from the 100-inch, it will show them still better, and also will probably resolve some of the still more distant outer galaxies.

Distance of the one in Andromeda is about 800,000 light years, which means that when you observe it, the light that enters your eye has been on the way for 8,000 centuries—it began its journey before man himself had appeared on earth. Other light rays are starting from it now. What will they find when they complete their journey in this direction?

Time Table for September

Sept.	EST	
3	9:00 a. m.	Venus beyond sun
7	10:57 p. m.	Moon in last quarter
10	5:58 a. m.	Moon passes Mars
12	4:46 a. m.	Moon passes Saturn
	6:00 a. m.	Moon nearest—226,000 miles
14	2:28 p. m.	New moon
	5:33 p. m.	Moon passes Venus
15	1:31 p. m.	Moon passes Mercury
19	4:44 a. m.	Moon passes Jupiter
22	12:42 a. m.	Moon in first quarter
23	4:29 p. m.	Beginning of autumn
24	2:00 a. m.	Moon farthest—251,400 miles
30	1:41 a. m.	Full moon

Subtract one hour for CST, two hours for MST, and three for PST.

Add one hour for the corresponding Daylight Saving Time.

Science News Letter, August 30, 1947

METALLURGY

Use Cold-Drawn Steel

➤ COLD-DRAWN steels are winning such an important place in many applications that standard specifications are now to be prepared by a technical committee of the Society of Automotive Engineers.

The undertaking is viewed as a step toward wider use of these basic materials in the automotive and other industries, with a resulting saving in time and production costs. Cold-drawn steels make better parts, it is claimed, such as bolts, studs, shafts, pinions, axle tubes, frame supports and shackle pins.

The cold-drawing of steels and other metals is not a new process, but one now more widely usable because of new technics. It consists of an operation to reduce the cross section of a rough metal bar, and to increase its length, by drawing it through a series of conical tapering holes in die plates. Each succeeding hole is a little smaller than the preceding one.

The holes may be round, square or of other shapes. The dies may be made of a number of materials ranging from industrial diamonds, tungsten carbide and steel to chilled cast iron. Metals can be formed to much closer dimensions by cold-drawing than by other ordinary processes. The method is used to produce wire, bars for bolts and other accessories, and to form tubing.

The term cold-drawing should be distinguished from cold-rolling and cold-working. Cold-working, a process used in ancient times by shaping metals by hammers, includes the other two. Cold-rolling, which consists of passing metals between a succession of heavy rollers, is used in the production of sheets, strip steels, flat wire and other products. It is used also to produce a hard, smooth, even finish for hot-rolled metals. The formation of metal for automobile tops and fenders, by pressure in a mold, is a widely-used process of cold-working.

Science News Letter, August 30, 1947

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Do You Know?

Guests in one St. Paul hotel, at least, may sleep under electrically heated *blankets* if they wish.

Ethyl alcohol has been successfully made from the milk sugar in whey, a by-product of cheese manufacturing.

A big game *hunter* states that when you are attempting to kill a beast, you must expect that it will in turn try to kill you.

Scientists conducting research on the *nuclear energy* that powers atomic bombs are attending summer school at the Oak Ridge, Tenn., plant.

Muskellunge, a large American freshwater pike, often reaches five feet in length and a weight of 60 pounds; it eats other fish, young ducks, muskrats, frogs, snakes and other animals.

A South American buyer recently gave an order in the United States for a large number of *flatirons* to a manufacturer who puts red handles on them instead of the customary black.

Unlike poisonous snakes, Gila monsters and the beaded lizard of Mexico have their fangs in their lower jaws; these are the only two of nearly 3,000 known *saurians* in the world that are venomous.

In nature many non-carnivorous *animals* fraternize; in the old days in America, deer, elk, antelope and bison often migrated together and, in East Africa today, antelopes and zebras associate in great herds.

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VETERINARY MEDICINE

Heavy Pheasant Losses

"Horse disease" caused many deaths among artificially reared pheasants. Vaccination has had only partial success as counter-measure.

➤ EQUINE encephalomyelitis, a serious disease of the nervous system so named because it was first observed in horses, caused disastrous losses among artificially reared pheasants in three outbreaks in New Jersey, Drs. F. R. Beaudette and J. J. Black of New Jersey Agricultural Experiment Station stated at the meeting in Cincinnati of the American Veterinary Medical Association. One of the outbreaks killed 3,757 birds out of a population of 5,094.

Vaccination has been attempted as a counter-measure, but apparently has had only partial success. Carrier of the disease has not yet been identified, but it is suspected to be something other than an insect.

Baby pigs have been dying at an alarming rate of a mysterious disease, in many parts of the Midwest. Dr. George A. Young, Jr., of Austin, Minn., offered a hypothesis that appears to convict sows as unwitting killers of their own offspring, with the milk of their first nursing as the weapon.

The course of events, as sketched by Dr. Young, includes, first, an infection of the brood-sow, then transmission of a sensitizing substance resulting from this infection through the circulation to the unborn pigs, and finally the concentration of an antibody to this substance in the milk glands. When the sensitized baby pigs first suckle their mother and receive her colostrum or first milk they get along with it this antibody, which produces an allergy-like reaction known as anaphylactic shock. In a large proportion of cases the outcome is fatal.

Dr. M. S. Shahan of the U. S. Department of Agriculture, who is in command of the American scientific forces fighting foot-and-mouth disease in Mexico, reported to the meeting on progress in the campaign. Because the necessary measures for eradication cause serious dislocations in the lives of the people, it involves much more than a straight-out onslaught of scientists against a pest. Social, economic, legal, educational, even religious factors have to be taken into account, the speaker said. He praised the Mexicans, both officials and the people at large, for their cooperation.

Science News Letter, August 30, 1947

MEDICINE

Deaths From Clots Cut

➤ DEATHS from pulmonary embolism, or clot in the main artery from the heart to the lungs, have been cut almost in half by an operation on veins in the legs, a Massachusetts General Hospital team of physicians and surgeons reports in the *Journal of the American Medical Association* (Aug. 23).

The doctors are Jacques Carlotti, French Government research fellow in medicine, Irad B. Hardy, Jr., Robert R. Linton and Paul D. White.

The operation consists in interrupting the femoral veins in the thighs. The object is to keep the clots, which usually originate in the calves, from travelling up the leg veins to the heart and pulmonary artery where they so often become fatal.

The operation was performed in only one patient in the period from 1936 to 1940. But it was done in 60 patients during the next five years. The mortality dropped from 50.7% in those without operation to 28.3% in those operated on.

Pulmonary embolism has generally been considered a frequent complication and cause of death after operations, broken bones and childbirth. Actually it is more frequent among medical patients, the Boston doctors found. More than half of all the patients with this condition in 10 years at the Massachusetts General Hospital were medical patients.

Most of the patients had heart disease. The great majority were over 40 years of age and men predominated.

Pain in the chest was the commonest

but not the earliest symptom. A simultaneous rise in temperature, pulse rate and breathing rate is often the first sign of the condition, sometimes occurring hours before any other change.

Doctors should constantly keep in mind the possibility of pulmonary embolism in medical patients, especially those with heart disease, the Boston doctors warn. When discovered, it should be treated by surgical interruption of the femoral veins in both legs, to prevent recurrence of the clots which could prove fatal.

Science News Letter, August 30, 1947

AERONAUTICS

England's Jet Planes

➤ ENGLAND is stepping forward with jet propelled planes, but America is not lagging. The British have announced what is claimed to be the first jet-propelled flying boat in the world, a fighter craft, and the first all-jet civil airliner.

The fighter flying boat, with two Metro-Vick jet engines housed within the hull, has made its first flight. It is a single-seater, with one large air intake right in front. Under reasonable conditions, this provides a minimum danger of water being picked up to enter the machine.

The Tudor Eight, a civil airliner powered with four Rolls-Royce Nene turbo-jets, is about ready for flight tests. England already has a plane, the Lancastrian, which made successful flights a year ago, but it has a combination of conventional propeller power and jet propulsion.

The earlier seven Tudor planes are all powered by propeller-driving engines of the conventional type, and vary in size from 12-passenger to 60-passenger craft. The first Tudor Four, a long-range 32-passenger plane, is now undergoing testing under tropical conditions in South America.

The United States has several all-jet and combination jet-plus-propeller planes, but they are all military craft and comparable with Britain's jet fighters. The first was the war-developed P-59 Bell Aircraft. Others include the Lockheed P-80 Shooting Star, Republic P-47 Thunderbolt, Douglas Skystreak, Ryan Fireball, and now the six-jet Martin XB-48 bomber. Also there is the Bell Aircraft XS-1, rocket powered, a special plane to beat the speed of sound.

The Martin XB-48 bomber is said to be the first six-jet airplane ever completed. It can carry a bomb load of over ten tons. Its six General Electric turbo-jet engines produce 24,000 pounds of thrust, and give the craft a speed of over 480 miles an hour.

The Ryan Fireballs are jet-plus-propeller planes. The newest Fireball, the Navy XFR-4, has a Westinghouse axial-flow engine near the rear, and a Wright Cyclone to drive the rotating propellers. The Douglas Skystreak is powered with General Electric TG-180 turbo-jet engines.

Science News Letter, August 30, 1947

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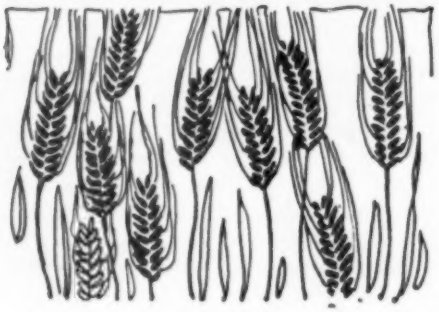
PLANT PHYSIOLOGY

NATURE RAMBLINGS

by Frank Thone



Pinned With Magnesium

➤ A RECIPE for making life possible on an uninhabited planet might very well begin, "Use 55 parts carbon, 72 parts hydrogen, five parts oxygen, four parts nitrogen, and one part magnesium." The "parts" are atoms, and the life-enabling recipe is the formula for chlorophyll *a*, one of the two green, sunlight-capturing, food-making pigments in all green plants. Its opposite number, chlorophyll *b*, differs by two atoms of hydrogen and one of oxygen, but winds up with the same single atom of magnesium.

Although the numbers of atoms of constituent elements in a molecule of chlorophyll is known, biochemists have not yet found out exactly how they are put together. Some tentative diagrams of its structure have been drawn up, and in practically all of them the "Mg" that symbolizes magnesium is shown at the center, as if it were the kingpin of an intricate mechanism. So it is in a sense; although we do not know what its exact function is in the activity of chlorophyll, it is certain that if that one magnesium atom were withdrawn, the remainder of the complex could no longer be called a chlorophyll molecule.

Chlorophyll, using sun-power to weld water and carbon dioxide together to form sugar, seems to act as a catalyst. That is, its own substance is neither increased nor diminished, even momentarily, by the process which it promotes, although the greater part of its bulk is made up of carbon, hydrogen and oxygen atoms—the identical elements that are bound together in the foodstuff formed by its action.

There is not even complete agreement about what that first-formed foodstuff is. It is usually said to be some form of sugar, but there are also plant physiologists who believe that starch is made first, then changed into sugar for transportation to other parts of the plant in solution. Sugars and starches are always found in such intimate association with active chlorophyll that it is extremely difficult to tell which came first.

Of this much, however, we may be certain: that without chlorophyll there would be no trees, no grainfields, no pastures, not even any mosses or green pond-scums. And every molecule of chlorophyll seems to be held together by a single pin of magnesium.

Science News Letter, August 30, 1947

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MINING

New Electric Cables Lessen Mine Hazards

➤ COAL MINE explosions will be fewer with a new non-sparking electric cable, and a new shock-proof cable will decrease danger from high-voltages in circuits leading to operating machinery.

Electric cables in mines that bring light and power from power lines to working faces usually are stretched along the floor where they are subjected to rough usage, being pulled about where needed. As a result, ordinary insulation wears away quickly and sparking often follows. These sparks, sufficient to ignite methane gas and coal dust, have caused many disastrous explosions. Leakage from high-voltage cable is exceedingly dangerous to men coming in contact with it. These trailing cables, as they are called, are used to power heavy moving machines.

The non-sparking cable, developed by the U. S. Rubber Company, New York City, and Leonard Wilson of Kenilworth Mines, Utah, has a fine strand of wire embedded between the inner and outer layers of insulation. If the insulation becomes damaged, this wire catches incipient current leakage before an arc can occur, and carries the leakage to a sensitive circuit breaker which cuts off the power.

The safe high-voltage cable, manufactured by the General Electric Company, is already in use in the Saddle Creek phosphate mine of the American Cyanamid Company. Each conductor of the three-wire cable is covered with a metal sheath woven around the outside of the individual insulation. Each sheath is in contact with those of the other two wires, and also with ground wires set in the spaces between them. The entire cable is covered with a tough rubber-like insulation.

In the event of a break or "fault" in any part of the cable, the high-voltage current would be carried immediately by the metal sheathing or the ground wires to a panel between the cable and the main power line and there activate a device to cut off the current.

Science News Letter, August 30, 1947

NUCLEAR PHYSICS

Betatron X-Rays Steel One Inch Thick in Second

➤ FLAWS in steel, for uses ranging from Navy guns to battleship armor, will be detected by a new 10,000,000-volt X-ray machine to be installed in the Naval Ordnance laboratory at White Oak, Md. It will take X-ray pictures of one-inch thick steel in one second.

The technical name of the machine is the betatron. It has now been completed by General Electric, Schenectady, N. Y., and is a small version of G.E's 100,000,000 electron-volt atom-smashing betatron. This new machine is the first of its size to be produced for industrial purposes. Its rays will penetrate a foot-thick piece of steel in minutes, as compared with hours needed previously.

Science News Letter, August 30, 1947

Books of the Week

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COLLEGE PHYSICS: Mechanics, Heat and Sound—Francis Weston Sears and Mark W. Zemansky—*Addison-Wesley,* 383 p., illus., $3.50. The first part of a textbook on college physics dealing with mechanics, heat and sound. It emphasizes physical principles with both background and application being given second place.

CURRENT TRENDS IN PSYCHOLOGY—Wayne Dennis, B. F. Skinner, R. R. Sears, E. L. Kelly, Carl Rogers, J. C. Flanagan, C. T. Morgan, Rensis Likert—*Univ. of Pitts.,* 225 p., $3.50. A collection of eight lectures under the auspices of the Dept. of Psychology of the Univ. of Pittsburgh covering experimental, child, clinical and personnel psychology, psychotherapy, human engineering, and the sample interview survey.

GENERAL COLLEGE CHEMISTRY—Leon B. Richardson and Andrew J. Scarlett—*Holt,* 4th ed., 704 p., illus., $4.25. Brought up-to-date with the inclusion of the most recent information on radioactivity and atomic structure, this new edition of a standard text should fulfill its expressed purpose, that of acquainting the student with the way a scientist thinks.

LABORATORY EXERCISES IN INORGANIC CHEMISTRY—W. Norton Jones—*Blakiston,* 315 p., illus., paper, $2.25. For freshman college courses, this new manual supplements the text by using laboratory procedures which develop fundamental principles.

PRECIPITATION AFFECTED BY SOLAR VARIATION—C. G. Abbot—*Smithsonian,* Misc. Coll., Vol. 107, No. 9, Publ. 3901, 4 p., paper, 10 cents. A statistical study of precipitation in areas which had previously been investigated with respect to a regular short variation of the sun and its effect on temperature. Precipitation was also shown to follow this sun period.

THEORY OF PERTURBATIONS IN STRATIFIED CURRENTS WITH APPLICATIONS TO AIR FLOW OVER MOUNTAIN BARRIERS—Paul Queney—*Univ. of Chicago,* Dept. of Meteorology, Misc. Rept. No. 23, 81 p., paper, $1.50. Develops a general theory for dealing with the subject using linear differential equations with constant coefficients; application of theory to deformation of current by a mountain range of constant cross section.

UNION LIST OF TECHNICAL PERIODICALS IN TWO HUNDRED LIBRARIES OF THE SCIENCE-TECHNOLOGY GROUP OF THE SPECIAL LIBRARIES ASSOCIATION—Elizabeth G. Bowerman, comp.—*Special Libraries Assn.,* 3rd ed., 285 p., $6.

Science News Letter, August 30, 1947

VETERINARY MEDICINE

Sulfa Drug for Turkeys

➤ SODIUM SULFAMERAZINE, one of the sulfa series of germ-stopping drugs, was found an effective remedy for turkeys having the usually highly fatal fowl cholera, Dr. J. O. Alberts of the University of Illinois reported. The drug was given to 30 out of 40 tom turkeys afflicted with this malady, while ten were left untreated, as controls. The treated 30 survived, the untreated 10 all died. When new outbreaks of the disease occurred later, the sulfamerazine treatment promptly stopped losses.

Sulfathiazole, another compound in the sulfa series, was reported beneficial to chickens suffering from fowl cholera by Dr. H. M. DeVolt of the University of Maryland. One per cent of the drug mixed in with their mash at feeding time seemed to be the optimum dose; less than that proved insufficient and more was apparently unnecessary. Moreover, if as much as two per cent were given it made some of the birds sick.

Sulfathiazole was a good preventive, too, when given 48 hours before the chickens were deliberately inoculated with the disease. It took 128 times as big a dose of germs to produce a fatal infection in chickens thus protected, as compared with unmedicated birds.

Science News Letter, August 30, 1947

PLANT PATHOLOGY

Pyrethrum, Bane to Bugs, Suffers from Fungus Pest

➤ PYRETHRUM, one of man's best weapons against insect pests, has itself become victim of a pest. Consequences may be serious.

As a result of the war, the cultivation of pyrethrum flowers from which the insecticide is extracted shifted from Japan to the British colony of Kenya in eastern Africa. The tall, daisy-like plants grow well on the uplands there.

Now all but one of the principal cultivation areas has been hit by a highly destructive fungus, reports R. M. Nattrass of Kenya Colony's Department of Agriculture, with headquarters at Nairobi, in a letter to *Nature* (July 26). In some fields as much as 80% of the yield was ruined.

The fungus, known botanically as *Ramularia bellunensis,* appears to be a native of Europe. At any rate, destructive outbreaks of it on chrysanthemum plants, which are close relatives of pyrethrum, have been reported from both England and Italy in the past.

Science News Letter, August 30, 1947

GENERAL SCIENCE

This Magazine's Stories Sent to Europe by Army

➤ STORIES about modern science from the *Science News Letter* were picked more often by the U. S. Army for publication in Germany, Austria and Trieste than articles from any other science magazine, the Army has disclosed.

More than 2,000 pieces of contemporary American writing have been picked for publication in the U. S.-licenced press in the three European zones. Of this cross-section of American reading, 24 stories came from the *Science News Letter.* A farm publication, with 25 selections, was the only magazine chosen more frequently than *Science News Letter.*

Popular science was one of the most-chosen subjects in the writing selected, edited and shipped by the War Department's Civil Affairs Division.

Science News Letter, August 30, 1947

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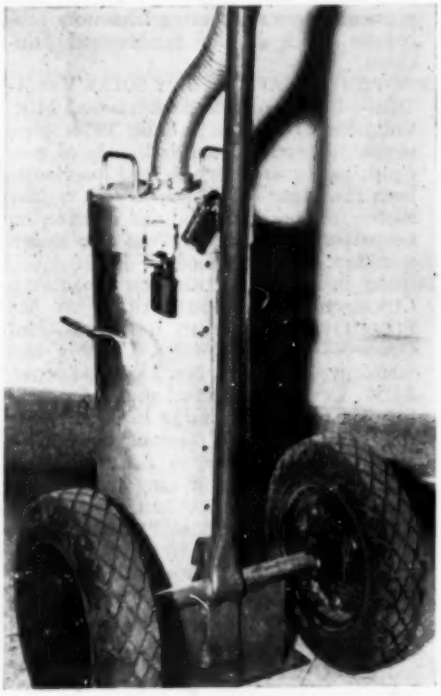
⚙ *BOTTLE CONTAINER for baby's bottle is a plastic cup with a conical top which has a removable projection covering the nipple itself. The container lessens danger of breaking when baby tosses the bottle to the floor, and it helps hold the temperature of the milk.*

Science News Letter, August 30, 1947

⚙ *VAPORIZING DEVICE, developed by the U. S. Department of Agriculture to increase humidity in chicken houses but usable in dry-country homes, consists of an electric fan that rotates a small water wheel whose vanes dip into a pan of water. The fan's breeze adds the water vapor to the air stream.*

Science News Letter, August 30, 1947

⚙ *COIN COLLECTOR from street parking meters, a home-made device built in the shops of an American city, has a coin tank, shown in the picture, made of iron sheets with welded joints. The tank is locked to the wheeled carriage, and has a flexible tube at the top with funnel into which the coins dump from the meter.*



Science News Letter, August 30, 1947

⚙ *AIRCRAFT slot antenna for radar altimeters fits into the wing or fuselage surface where it offers no drag to the air. It consists of an aluminum cavity with the exposed face of the antenna covered with a transparent plastic, and is designed to replace protruding antenna now in use.*

Science News Letter, August 30, 1947

⚙ *PLASTIC CEMENT, that will hold an ordinary wire paper clip bonded to paper, is an almost universal adhesive that will bind many kinds of materials together. It is clear and colorless, dries quickly, is waterproof, and can be used to mend torn leather, cloth and board book bindings.*

Science News Letter, August 30, 1947

Question Box

AERONAUTICS

Is the personal plane of 1957 likely to have a jet engine? p. 134.

AGRICULTURE

What chemical rescued thousands of acres of corn in drenched fields? p. 130.

ASTRONOMY

What signs of autumn appear in the skies next month? p. 138.

What star had its secrets hidden from astronomers behind an iron curtain? p. 130.

BIOCHEMISTRY

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BIOLOGY

How many molds act as enemies of soft corn? p. 131.

CHEMISTRY

What practical use has been found for Germanium? p. 136.

ENTOMOLOGY

From what fruit has a fly poison been extracted? p. 136.

Where do mosquitoes grow in trees? p. 136.

INVENTION

How is a rocket used in life-saving? p. 131.

MEDICINE

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What remedy may replace silver nitrate for babies' sore eyes? p. 137.

PHYSICS

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PHYSIOLOGY

What vitamin will help you to withstand extreme cold? p. 134.

VETERINARY MEDICINE

How can germs be smuggled into man? p. 132.

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What new steps are being taken toward the control of rabies? p. 133.

What new use had been found for PABA? p. 130.

Pictures: Cover, Zoological Society of San Diego; p. 131, NAS; p. 133, General Electric; p. 134, Glenn L. Martin.

Books

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